a cylinder (4);

a piston (2,3) disposed within the cylinder (4).

Noltner discloses at least one electric coil (5) placed to enclose changing magnetic flux caused by the magnetic moment associated with the piston (2,3) whereby an emf is generated in the electric coil (5), so that an external circuit (8,9) connected to the electric coil (5) receives electric power from the electric coil (5). Noltner discloses an exhaust passage (7) connected to at least one of the cylinder extension (4) and the end closure. Noltner discloses a piston extension (1) at least one of formed integrally with and attached to the piston (2,3). Noltner discloses that the magnetic moment associated with the piston (2,3) is provided by a magnet attached to at least one of the piston (2,3) and the piston extension. Noltner discloses that the magnetic moment associated with the piston (2,3) is provided by forming at least one of the piston (2,3) and the piston extension of a material having a magnetic moment. Noltner discloses that the inlet flow path includes a choke (11 and 10).

However, Noltner does not disclose a cylinder having a first end connectable through an inlet flow path to an air supply passage containing air at a positive pressure, a second end of the cylinder being open. Noltner does not disclose that the piston is also positionable in a second location wherein the first portion of the piston is outside of the cylinder so that clearance is provided between the piston and the cylinder so that air may exhaust from the cylinder. Noltner does not disclose a

first cylinder having a first end connectable through a first inlet flow path to an air supply passage, a second end of the first cylinder being open. Noltner does not disclose a second cylinder having a first end connectable through a second inlet flow path to the air supply passage, a second end of the second cylinder being open.

Noltner does not disclose that the piston is positionable in a first location wherein the first end portion of the piston is disposed within the first cylinder and the second end portion of the piston is disposed outside of the second cylinder. Noltner does not disclose that the piston is positionable in a second location wherein the second end portion of the piston is disposed within the second cylinder and the first portion of the piston is outside of the first cylinder. Noltner does not disclose that when the piston is disposed in the first position, air pressure received in the first cylinder through the first inlet flow path drives the piston toward the second position, whereupon the first cylinder exhausts, and when the piston is disposed in the second position, air pressure received in the second cylinder through the second inlet flow path drives the piston toward the first position, whereupon the second cylinder exhausts, so that the piston oscillates.

Noltner does not disclose sealing means disposed on at least one of an outer surface of the first portion of the piston and an inner surface of the cylinder to prevent loss of air between the piston and the cylinder and permit air pressure in the cylinder

to increase when the first portion of the piston is disposed within the cylinder. Noltner does not disclose that the sealing means is an O-ring in a groove formed on the outer surface of the first portion of the piston. Noltner does not disclose that the inlet flow path includes an electrically actuated shutoff valve to prevent air flow through the generator, thereby turning off the generator. Noltner does not disclose that the at least one electric coil is connected to a rectifier to supply DC electric power. Noltner does not disclose that the rectifier is a full bridge rectifier to supply DC electric power whenever a net flux through the at least one electric coil is changing.

Oudet et al. disclose a pneumatic device (figure 5) comprising:

a cylinder (70) having a first end (75) connectable through an inlet flow path (80) to an air supply passage containing air at a positive pressure, a second end of the cylinder (70) being open (911 93). Oudet et al. disclose a piston (56) having a magnetic moment associated therewith, the piston (56) being positionable in a first location wherein at least a first portion of the piston (56) is disposed within the cylinder (70). Oudet et al. disclose that the piston (56) also being positionable in a second location wherein the first portion of the piston (56) is outside of the cylinder (70).

Oudet et al. disclose that clearance is provided between the piston (56) and the cylinder (70) so that air may exhaust from the cylinder (column 8, lines 48 to 58). Oudet et al. disclose

means (52) engaging the piston (56) for biasing the piston (56) from the second position toward the first position so that after the cylinder (70) has substantially exhausted, the piston (56) moves to the first position, whereby the piston (56) oscillates, moving back and forth between the first position and the second position, driven by air supplied through such air supply passage to the cylinder (70).

Oudet et al. disclose at least one electric coil (100, 101) placed to enclose changing magnetic flux caused by the magnetic moment associated with the piston (56) disposed outside of the second cylinder (71). Oudet et al. disclose that the piston (56) is further positionable in a second location wherein the second end portion of the piston (56) is disposed within the second cylinder (71) and the first portion of the piston (56) is outside of the first cylinder (70). Oudet et al. disclose that when the piston (56) is disposed in the first position, air pressure received in the first cylinder (70) through the first inlet flowpath (80) drives the piston (56) toward the second position, whereupon the first cylinder (70) exhausts, and when the piston (56) is disposed in the second position, air pressure received in the second cylinder (71) through the second inlet flowpath (82) drives the piston (56) toward the first position, whereupon the second cylinder (82) exhausts, so that the piston (56) oscillates (column 8, lines 48 to 58).

Oudet et al. disclose at least one electric coil (100, 101) placed to enclose changing magnetic flux caused by the magnetic

moment associated with the piston (56) whereby an emf is generated in the electric coil (100, 101), so that an external circuit connected to the electric coil (100, 101) receives electric power from the electric coil (100,101). Oudet et al. disclose that the actuator further includes a spring (51, 52) engaging the piston (56) to bias the piston (56) toward one of the first position and the second position to facilitate starting the generator when air is supplied through the first air supply passage (80) and the second air supply passage (82). The invention of Oudet et al. has the purpose of generating a force by means of significant applied electric power and having optimal space requirements.

Carroll discloses sealing means (79, 80) disposed on at least one of an outer surface of the first portion of the piston (70) and an inner surface (65) of the cylinder. Carroll discloses that the sealing means (79,80) is an O-ring inserted in a groove formed on the outer surface of the first portion of the piston (70). Carroll discloses a cylinder extension (above 8) at least one of formed integrally with and attached to the cylinder (8), the cylinder extension (above 8) having an inner surface having a transverse dimension greater than a transverse dimension of the cylinder (8), the cylinder extension (above 8) having an end closure (75).

Carroll discloses that at least a portion of the piston extension contacting at least a portion of the cylinder extension to provide positional constraint to the piston (70). Carroll

discloses that the portion of the piston extension contacting at least a portion of the cylinder extension is an outer surface of the piston extension and the portion of the cylinder extension is an inner surface of the cylinder extension. Carroll's invention has the purpose of avoiding escape of air between the piston and the cylinder.

It would have been obvious at the time the invention was made to modify the electromagnetic actuator of Noltner and provide it with the cylinder, inlet flow paths, piston, springs, electric coils, and sealing means configurations disclosed by Oudet et al. and Carroll for the purpose of having optimal space requirements and avoiding escape of air between the piston and the cylinder.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute the piston type control valve disclose by Noltner with an electric actuated shutoff valve, since the examiner takes Official Notice of the equivalence of the electric actuated shutoff valve and the piston type control valve for their use in the electric generator structure art and the selection of any of these known equivalents to prevent air flow through the generator would be within the level of ordinary skill in the art.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to connect the electric coil to a full bridge rectifier since it was known in the art that the full bridge rectifier is used to supply DC

electric power whenever a net flux through the coils is changing."

Applicant cannot believe that it would be obvious to one of ordinary skill in the art to modify the electromagnetic actuator of Noltner and provide it with a cylinder, inlet flow paths, piston springs, electric coils and sealing means configurations disclosed by Oudet et al. and Carroll for the purpose of having optimal space requirements and avoiding escape of air between the piston and cylinder. There is so little disclosed by Noltner, as indicated by the Examiner, that it would require major changes in both Noltner and Oudet et al. to try to configure a pneumatic driven electric power generator that would work.

Items 70 and 71 are referred to as lateral poles by Oudet et al. Oudet et al. states, "The mobile device 50 includes a solid cylindrical part which moves axially in the cylindrical space delimited by the lateral stator poles 70 and 71 and the central stator pole 54." And further, "These two volumes are connected by means of spaces 92,93 separating the central pole from the lateral poles 70 or 71." (Column 6, lines 65 to column 7, line 1) and (column 8, line 45-47).

The invention of Oudet provides dual cylinders that are defined by such lateral stator poles 70,71. The mobile device 50 of Oudet is positioned either in first cylinder delimited by lateral pole 70 or in second cylinder defined by lateral pole 71. Pressurized fluid enters from either input 80 or 82 and exhausts via gaps 91 and 93 or gaps 90 and 92 to pressure outlets 81 and

83, respectively. Springs (biasing means) 51 and 52 are positioned on either end of the mobile device 50. As Oudet states, "Springs 51, 52 ensure the positioning of the mobile device in a position in which the junction 53 between the two ring shaped magnets 10 and 11 corresponds to the middle of the central pole 54." The teaching of Oudet et al., thus, provides for two springs or biasing means positioned on either end of the mobile device 50 which includes what the Examiner refers to as piston 56. Oudet et al. refers to 56 as a central hub. The teaching further includes what is essentially two mirror image cylinders each having their own separate inlets and outlets. There is never any transfer of fluid from the first cylinder to the second cylinder. When the mobile device is moved sufficiently from the first cylinder, pressurized fluid exhausts through gaps 91 and 93. Then second spring 51 and pressurized fluid from input 82 forces the mobile device away from the second cylinder until the pressurized fluid is exhausted through gaps 90 and 92. The mobile device in the first cylinder is returned by means of first spring 52 and pressurized fluid from input 80. Thus, the teaching of Oudet requires the use of two sets of springs, two pressurized fluid inlets and at least two exhaust ports (Oudet et al. has four exhaust ports) and as constructed will not operate properly with only one biasing means and one pressurized inlet.

The present invention, on the other hand, has one biasing means which is not positioned in the first cylinder. The present invention, as defined by claim 1, provides, "means engaging said

piston for biasing said piston from said second position toward said first position so that after said first cylinder has substantially exhausted, said piston moves to said first position, whereby said piston oscillates, moving back and forth between said first position and said second position, driven by air supplied through such air supply passage to said cylinder".

The present invention further has only one cylinder with a first end connectable through an inlet flow path to an air supply passage. The teaching of Oudet et al. requires two inlet flow paths, one on each end of the device; a first connectable to a first cylinder and the second connectable to the second cylinder. The present invention provides for only one inlet flow path which is connectable to a first end of "said cylinder".

There is no mention at all in Oudet et al. that the piston 56 has a magnetic moment associated with it. The only mention of piston 56 in Oudet et al. is, "A central hub 56 is the final component of the mobile device 50." (column 7, lines 8,9). The present invention as defined by claim 1 provides for "a piston having a magnetic moment associated therewith". Although Noltner discloses a magnetic moment associated with piston (2,3), it is very difficult to understand how the piston of Noltner could replace the piston of Oudet, et al. or vice versa and come up with a unit that would work.

Further, the teaching of Oudet provides for an actuator, "Contrary to current teachings in the field, the three pole actuator according to the invention incorporates one central pole

and two lateral poles of different sizes. This embodiment, which the specialist find surprising, nevertheless makes it possible to maintain satisfactory performance levels while making possible the housing of a coil incorporating a large volume of copper." (Column 2, lines 3-12). There are no such poles provided in the present invention.

Since the teaching of Noltner in view of Oudet et al. is significantly different from that presented in the present invention, Applicant respectfully requests that the Examiner withdraw the rejection of claims 1 to 2, 4-5 to 7, 11 to 12, 14 to 21 under 35 U.S.C. 103(a) as being unpatentable over Noltner (DE 2355728A) in view of Oudet et al. (U.S. Pat. No. 5,559,378) and further in view of Carroll (U.S. Pat. No. 5,350,222).

Further in the office action the Examiner rejected claim 3 under 35 U.S.C. 103(a) as being unpatentable over Noltner in view of Oudet et al. and further of Carroll in view of Fiegel et al. (U.S. Pat. No. 5,826,952).

To support the rejection the Examiner stated,

"Noltner, Oudet et al. and Carroll disclose a pneumatically driven electric power generator as described on item 1 above. However, neither Noltner, Oudet et al. nor Carroll disclose that the inlet flow path includes an air filter for excluding foreign material from the cylinder.

Feigel et al. disclose that the inlet flow path (33) includes an air filter (62) to exclude foreign material from the

cylinder for the purpose of prevent the ingress of dirt particles.

It would have been obvious at the time the invention was made to modify the pneumatically driven electric power generator of Noltner, Oudet et al. and Carrol and provide it with an inlet flow path including an air filter as disclosed by Feigel et al. for the purpose of excluding foreign material from the cylinder."

Applicant has already discussed that modifying Noltner's power driven generator with the teaching of Oudet et al. would not provide a workable unit and since Feigel is only used to provide prior art of the use of a filter for the inlet air, Applicant respectfully requests that the Examiner withdraw the rejection of claim 3 under 35 U.S.C. 103(a) as being unpatentable over Noltner in view of Oudet et al. and further of Carroll in view of Fiegel et al. (U.S. Pat. No. 5,826,952).

The Examiner also rejected claim 8 under 35 U.S.C. 103(a) as being unpatentable over Noltner in view of Oudet et al. and further of Carroll in view of Dunne et al. (U.S. Pat. No. 3,661,051).

To support the rejection the Examiner stated,

"Noltner, Oudet et al. and Carroll disclose a pneumatically driven electric power generator as described on item 1 above. However, neither Noltner, Oudet et al. nor Carroll disclose that at least one of the outer surface of the piston extension and the inner surface of the cylinder extension is at least one of made from and coated with a low friction material.

Dunne et al. disclose that at least one of the outer surface of the piston extension and the inner surface of the cylinder extension is at least one of made from and coated with a low friction material (column 4, lines 51 to 57) for the purpose of reducing wear on the pistons.

It would have been obvious at the time the invention was made to modify the pneumatically driven electric power generator of Noltner, Oudet et al. and Carroll and provide it with at least one of the outer surface of the piston extension and the inner surface of the cylinder extension made from and coated with a low friction material as disclosed by Dunne et al. for the purpose of reducing the wear on the pistons surface during operation."

The Examiner also rejected claim 13 under 35 U.S.C. 103(a) as being unpatentable over Noltner in view of Oudet et al. and further of Carroll in view of Ball et al. (U.S. Pat. No. 5, 890,460). The Examiner stated,

"Noltner, Oudet et al. and Carroll disclose a pneumatically driven electric power generator as described on item 1 above. However, neither Noltner, Oudet et al. nor Carroll disclose that the exhaust passage includes a muffler to reduce noise released from the generator.

Ball et al. disclose that the exhaust passage (1179) includes a muffler (1178) to reduce noise released from the generator for the purpose of reducing noise emitted by the engine and the generator.

It would have been obvicus at the time the invention was made to modify the pneumatically driven electric power generator of Noltner, Oudet et al. and Carroll and provide it with an the exhaust passage including a muffler as disclosed by Ball et al. for the purpose of reducing noise released from the generator."

Applicant has previously discussed in responding to the examiner's rejection of claim 1 that modifying Noltner's power driven generator with the teaching of Oudet et al. would not provide a workable unit. Dunne is only used as prior art to suggest that at least one of the outer surface of the piston extension and the inner surface of the cylinder extension is at least one of made from and coated with a low friction material. Ball is only used for the purpose of including a muffler for the purpose of reducing noise released from the generator. Therefore, Applicant respectfully requests that the Examiner withdraw the rejection of claim 8 under 35 U.S.C. 103(a) as being unpatentable over Noltner in view of Oudet et al. and further of Carrol in view of Dunne et al. (U.S. Pat. No. 3,661,051) and claim 13 under 35 U.S.C. 103(a) as being unpatentable over Noltner in view of Oudet et al. and further of Carroll in view of Ball et al. (U.S. Pat. No. 5, 890,460).

Further the Examiner rejected claims 9 to 10 under 35 U.S.C. 103(a) as being unpatentable over Noltner in view of Oudet et al. and further of Carroll in view of Young (U.S. Patent No. 4,697, 113). The Examiner stated,

"Noltner, Oudet et al. and Carroll disclose a pneumatically driven electric power generator as described on item 1 above. However, neither Noltner, Oudet et al. nor Carroll disclose that the piston extension has at least one longitudinal air passage to carry air to an end of the piston adjacent the end closure, the exhaust being connected to the end closure. Neither Noltner, Oudet et al. nor Carroll disclose that the at least one longitudinal air passage is a longitudinal slot formed in the outer surface of the piston extension.

Young discloses that the piston extension (17) has at least one longitudinal air passage (column 5, lines 3 to 9) to carry air to an end of the piston (17) adjacent the end closure, the exhaust being connected to the end closure. Young discloses that the at least one longitudinal air passage is a longitudinal slot formed in the outer surface of the piston extension (17). Young's invention has the purpose of keeping equal pressures between two different spaces.

It would have been obvious at the time the invention was made to modify the pneumatically driven electric power generator of Noltner, Oudet et al. and Carroll and provide it with a piston extension having at least one longitudinal air passage as disclosed by Young for the purpose of keeping equal pressures between two different spaces."

Applicant cannot understand how one can provide a pneumatically driven electric power generator, according to Noltner, with the cylinder, springs, fluid pressure inlet and

exhausts, etc. as provided by Oudet et al. and further modify it with a piston extension having at least one longitudinal air passage as disclosed by Young for the purpose of keeping equal pressures between two different spaces. There is no way a piston extension could be added to the piston of Oudet et al., nor is it possible to provide at least one longitudinal air passage as disclosed by Young for the purpose of keeping equal pressures between two different spaces when applied to the disclosure of Oudet et al. If the different spaces had equal pressure the piston of Oudet et al. would not oscillate. In the present invention when the piston of the present invention is moved sufficiently so that pressurized fluid can escape around the piston and is vented, the biasing means forces the piston back to the cylinder to where a seal is formed and then pressurized fluid builds up and forces the piston away again and the cycle is repeated.

Therefore, Applicant respectfully requests that the Examiner withdraw the rejection of claims 9 and 10 under 35 U.S.C. 103(a) as being unpatentable over Noltner in view of Oudet et al. and further of Carroll in view of Young (U.S. Pat. No. 4,697, 113).

In view of the discussion supra, it is believed that the invention as described in claims 1-20 is patentable and that this application is now in condition for allowance and such allowance by the Examiner is respectfully requested.

In the event the Examiner has further difficulties with the examination and/or allowance of the application, she is invited

to contact the undersigned agent for applicant by telephone at (412) 380-0725, if necessary, to resolve any remaining questions or issues by interview and/or Examiner's Amendment as to any matter.

Respectfully submitted,
James Ray and Associates

By Amos Bartoli
Amos Bartoli
Registration No. 42,299
Agent for Applicant

JAMES RAY & ASSOCIATES
2640 Pitcairn Road
Monroeville, PA 15146
Tel. (412) 380-0725
Fax (412) 380-0748